

Compact Ka-band Feed Design Validation and Shaped Reflector Design for ISS and Ka-band RF Comm Demonstration for future Earth Observing Missions

Completed Technology Project (2012 - 2015)



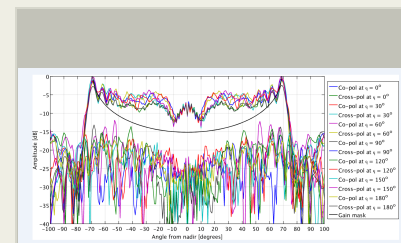
Project Introduction

The objectives of this proposal include building an antenna feed for Ka-band reflector antennas and to re-design an earth-shaped reflector antenna prototype for an orbit altitude of 424 km for a possible demonstration on the International Space Station (ISS). By the end of the first year, a compact wideband antenna feed operating at NASA's Ka-band frequency allocation would be built and tested and the new reflector design will be accomplished.

This work brings an innovative solution by providing an Earth coverage antenna (ECA) for LEO missions operating at Ka-band frequencies, which was previously an open question and something that has never been developed. An ECA will be the most appropriate solution for missions wanting to go to higher data rates than currently provided by X-band comm systems, but with ultra-stable platform requirements. For the ISS specific application, the reflector will have to be slightly different than it would be for a ECA for an Earth observing satellite, however this effort will demonstrate Goddard Space Flight Center capabilities in designing this type of antenna for space applications

Anticipated Benefits

This IRAD helps mature one of the possible antenna options that could be used for Earth observing (EO) missions at low Earth orbits (LEO) that cannot afford a high power RF transmitter onboard.



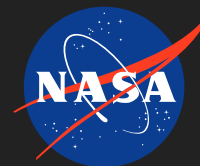
Measured Radiation Pattern of the Antenna

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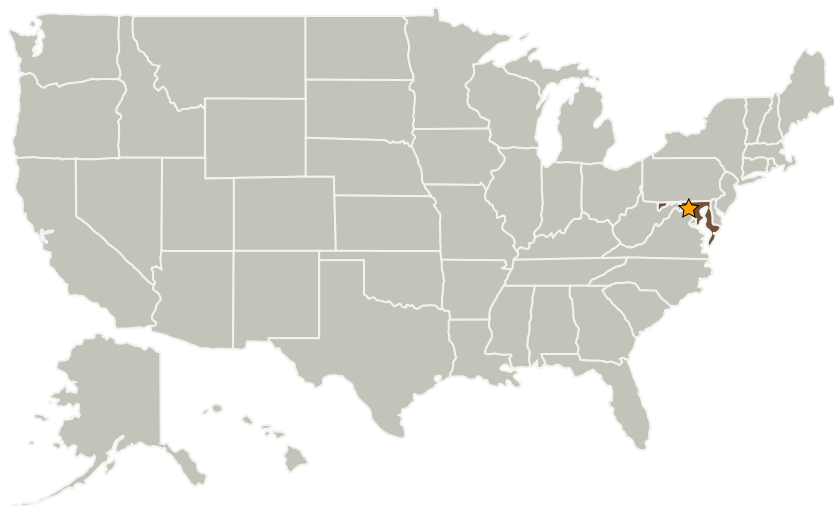
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Goddard Space Flight Center (GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
MEI Technologies	Supporting Organization	Industry Small Disadvantaged Business (SDB), Veteran-Owned Small Business (VOSB)	

Primary U.S. Work Locations

Maryland

Project Transitions

October 2012: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

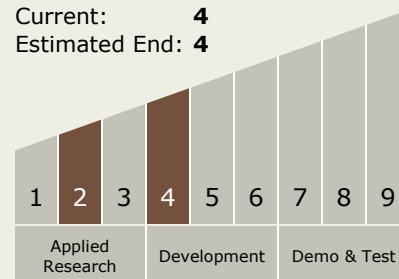
Wesley A Powell

Principal Investigator:

Victor J Marrero Fontanez

Technology Maturity (TRL)

Start: 2
Current: 4
Estimated End: 4



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✓ September 2015: Closed out

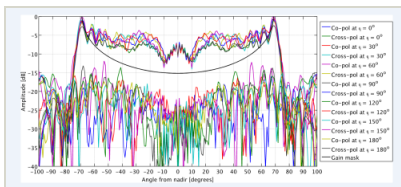
Closeout Summary: The purpose of the Goddard Space Flight Center's Internal Research and Development (IRAD) program is to support new technology development and to address scientific challenges. Each year, Principal Investigators (PIs) submit IRAD proposals and compete for funding for their development projects. Goddard's IRAD program supports eight Lines of Business: Astrophysics; Communications and Navigation; Cross-Cutting Technology and Capabilities; Earth Science; Heliophysics; Planetary Science; Science Small Satellites Technology; and Suborbital Platforms and Range Services. Task progress is evaluated twice a year at the Mid-term IRAD review and the end of the year. When the funding period has ended, the PIs compete again for IRAD funding or seek new sources of development and research funding or agree to external partnerships and collaborations. In some cases, when the development work has reached the appropriate Technology Readiness Level (TRL) level, the product is integrated into an actual NASA mission or used to support other government agencies. The technology may also be licensed out to the industry. The completion of a project does not necessarily indicate that the development work has stopped. The work could potentially continue in the future as a follow-on IRAD; or used in collaboration or partnership with Academia, Industry and other Government Agencies. If you are interested in partnering with NASA, see the TechPort Partnerships documentation available on the TechPort Help tab. <http://techport.nasa.gov/help>

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - ↳ TX05.2 Radio Frequency
 - ↳ TX05.2.6 Innovative Antennas

Images



Compact Ka-band Feed Design Validation and Shaped Reflector Design

Measured Radiation Pattern of the Antenna

(<https://techport.nasa.gov/image/36873>)

Links

GSC-16946-1

(<https://ntts.arc.nasa.gov/app/>)

Project Website:

<http://sciences.gsfc.nasa.gov/sed/>